

details are given on the last transit of Venus, on spectroscopic methods, photography and photometry, &c. In the third part additional data are given with reference to the sun, its temperature, spots, rotation, spectrum, &c.; the chapter on Comets has been to a great extent rewritten, and additional recent data given with respect to meteorites. Part 4, referring to stars and star-systems, astro-physical research, the development of our earth, &c., has also been considerably modified and added to. Several important modifications have also been made in the Appendix. The literature of the subject has been considerably extended and rearranged, while a series of biographical sketches of astronomers from the earliest date down to the present time has been added, a feature of great interest and utility. As frontispiece there is a fine portrait of Sir William Herschel. These are a few of the modifications which have been made in the German edition of Prof. Newcomb's work, some of which the author may consider it advisable to adopt in a new edition.

The Chemical Cause of Life Theoretically and Experimentally Examined. By Oscar Loew and Thomas Bokorny. *Brochure.* (Munich, 1881.)

THIS is a very important addition to our knowledge of the chemistry of plant life, or rather perhaps of the chemical reactions of "living" protoplasm. It is divided into two parts, a theoretical and experimental, following the idea first started by Pflüger concerning "physiological combustion in the living organism." One of the authors has already (*Pflüger's Archiv*, xii. 510) enunciated an hypothesis as to the formation of albumin by condensation of aldehydic groups with amido groups. As Nägeli has shown, various varieties of mould and Bacteria are able to build up the very complex albuminoid groups from relatively very simply constituted bodies like ammoniac acetate, also from bodies like sugar, glycerine, &c., in the presence of ammonia or ammonia salts; it may be assumed that the same atomic group is split off and assimilated by the organism. The authors are of opinion that a group CHOH isomeric with formic aldehyde is the first or starting group in the formation of albuminoids. Such a group might possibly be formed, for example, by the oxidising action of moulds on acetic acid; or it might be split off from compounds where it already exists, the neighbouring group becoming fully oxidised. Considering that ammoniac acetate and methylamine suffice under proper conditions for the building up of albuminoid groups, an otherwise constituted body than aldehyde can scarcely be considered. As the proportion of carbon to nitrogen in albumin is as 4 to 1, four such aldehyde groups may be imagined to combine with one molecule of am-



monia to a group $\begin{array}{c} | \\ \text{CH}_2\text{COH} \end{array}$, which, although not yet isolated would be an aldehyde of aspartic acid; and a $3\text{H}_2\text{NCH} \cdot \text{COH}$

further condensation of $\begin{array}{c} | \\ \text{CH}_2 \cdot \text{COH} \end{array}$, to $\text{C}_{12}\text{H}_{17}\text{N}_3\text{O}_9$,

and this again under the reducing action of sulphur to $\text{C}_{72}\text{H}_{112}\text{N}_{18}\text{SO}_{22}$, two molecules of water being eliminated at each condensation. To prove the presence of an aldehyde group in living cells the reducing power of that body on solutions of salts of several easily reducible metals was examined in detail. The most reliable and rapid indication of the existence of aldehyde groups was found to be a very dilute silver solution. This reagent was decided upon after a very thorough examination of a number of other metallic salts with aldehyde and other carbon compounds. The experiments with cell substance or protoplasm of *Algæ*, &c., show that during the period of "living" the silver salt is always reduced to metal, but that when by any means heating or drying by the action of salts, &c.—which exert a dehydrating or anti-

septic action by which the "life" of the plant is destroyed—the reducing action on silver salts is destroyed also. Some of the alkaloids afford a striking exception, the cell's substance yielding an equally distinct silver reaction before and after a week's treatment with one per cent. solution of strychnine, &c. The authors are of opinion that certain aldehyde groups exist in protoplasm, and that it is to the chemical energy of such groups that the "living properties" of the protoplasm are to be ascribed.

Between the Amazons and Andes; or, Ten Years of a Lady's Travels in the Pampas, Gran Chaco, Paraguay, and Matto Grosso. By Mrs. M. G. Mulhall. (London: Edward Stanford, 1881.)

THE regions traversed by Mrs. Mulhall have always had a great fascination for the traveller, and though a good deal has been done of late years towards obtaining an exact knowledge of these remote parts of the world, still there are vast tracts of country between the Andes and the Atlantic, which offer virgin fields for geographical research.

From Buenos Ayres to Cordoba, to Mendoza, and beyond the latter as far as the Inca's Bridge, with an excursion by sea to Rio Grande, and back by land by way of Villa de Melo, not to count sundry short excursions, constitutes a tour extending over several thousands of miles, that required all the courage and determination of an Englishwoman to accomplish, as Mrs. Mulhall has done, successfully; and this record of her visit to the ruined shrines of the Jesuit missions, to the hunting-grounds of several native tribes, to the little-trodden forests of the Amazons, and to the slopes of the Andes, will be read with interest and profit.

Mrs. Mulhall's account of the plague at Buenos Ayres in 1870 is most graphic: the destruction was fearful, the city losing 26,000 souls. The natural history notes are not numerous; now and then, however, some facts of interest are mentioned. On the line of the San Louis Railway the ostriches are so numerous as to cause much trouble; for whenever a workman left any bolt or screw out of his hand, were it only for a moment, they disappeared, being swallowed up by these birds, and one of the engineers declared that they even went so far as to pick the bolts out of the iron bridges if they were left by chance unriveted!

At Corrientes, the house of a friend of Bonpland, the botanist and companion of Humboldt, was visited, and Mrs. Mulhall gives us an extract from a manuscript in Bonpland's handwriting which begins: "I was born at Rochelle on August 29, 1773. My real name was Amadé Goujaud. My father—a physician—intended me for the same profession. It was on account of my great love for plants that he gave me the sobriquet of Bon-plant, which I afterwards adopted instead of my family name."

At Lomas a farmer's wife gave the authoress a sample of white silk made by a large harmless gregarious spider. The silk appeared suitable for weaving, and a pair of stockings made from it are said to have been sent as a present to the King of Spain.

As an appendix to the second volume there is a history of the rise and fall of the Jesuit Missions in South America. The rise of these Missions marked a period of great prosperity. During the seventeenth and eighteenth centuries they were a theme of admiration among the writers and statesmen of Europe. To-day the traveller sees but the ruins of splendid churches that were built during that time, and the remains of some native sculpture and wood carving.

Geometrical Exercises for Beginners. By Samuel Constable. (London: Macmillan, 1882.)

THE title of this book seems to us hardly to hit the object for which it is really adapted. Exercises for

beginners we should expect to be confined to the very simplest deductions, and these should be most carefully graduated, whereas the exercises before us do not seem to be arranged in any very clearly-defined order. For instance, at one time we are in the first book, in the next question in the sixth book, and then back to the third, and so on. The references are apparently to Euclid, but not to editions in use in this country, as our author inserts on pp. 118, 120, 121, propositions which figure as Euc. vi. B, C, D, in Simson's text; on p. 126 a solution is given from Lardiner's (*sic*) Euclid.

The solution on p. 112 strikes us as not being the neatest that can be given of the exercise, and the figures on pp. 109, 110 are a little wrong. Having had our grumble, we must now say that we think Mr. Constable has produced a very fair book, with neat solutions and good figures, but we do not consider such a book called for. Every mathematical master has such a collection either in manuscript or ready for *vivâ voce* teaching, and has the more advanced works of McDowell and Casey on his shelves. We can, however, suggest that the little book may be of use in preparation for University Local, and other examinations, though we do not see its suitability for *beginners*.

Algebra. Part II. By E. J. Gross, M.A. Second Edition. (London: Rivington, 1882.)

WE are glad to see that this work has been so appreciated, that a second edition has been called for. The main defect of the first edition, in our opinion, was the plentiful crop of errata. This volume, we notice, has not been at all altered in the text, but very many of the errors have been corrected: we wish we could say that all errors had been removed, but this is not so. There are one or two curious slips: thus, for instance, in the Answers, p. 313, a correction is retained from the earlier edition, whilst the indicated alteration has been made in the text. Barring the errata, we again confidently commend Mr. Gross's book.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.]

Pronunciation of Deaf Mutes who have been Taught to Speak

THE conclusions arrived at by M. Hément (*Comptes Rendus*, xciii. pp. 754, 861, 1095) and Mr. Axon (*NATURE*, vol. xxv. pp. 101, 409; *Comptes Rendus*, xciii. p. 904) concerning the influence of heredity upon the speech of the deaf cannot be accepted unless it can be shown that the peculiarities of utterance to which they have directed attention could not have arisen in the ordinary way by imitation of the speech of others.

Before we can decide whether any observed peculiarity in the utterance of a deaf person is due to inheritance or to imitation, we must know (1) at what age he became deaf; (2) whether the deafness was total or partial; and (3) whether, since the acquisition of speech by the sense of sight, the deaf subject has associated with persons who speak with the accent of his native district.

The remarks of M. Hément are valuable as the result of personal observations, but he has failed to be explicit upon these important points.

The cases referred to by Mr. Axon are equally inconclusive for the following reasons:—

1. In the first case noted (*NATURE*, vol. xxv. p. 101)—which is also the one to which Mr. Axon directs special attention in his recent letter to *NATURE*, vol. xxv. p. 409—we have a case of undoubted imitation through the sense of hearing.

Indeed it is stated in the *Phil. Trans.* No. 312, that some

weeks after recovery from an illness, this young man (Daniel Fraser) "began to *hear* and in process of time to understand speech. This naturally disposed him to *imitate* what he heard and to attempt to speak."

The account from which this is quoted, is evidently intended simply as a record of a case of recovery of hearing in a deaf mute, with subsequent acquisition of speech; and Mr. Axon himself admits that the writer mentions the inheritance of the Highland accent "in a purely incidental manner."

With due deference to Mr. Axon's opinion, it appears to me that this is not a case in point, and that it is not entitled to the same consideration as that of a person who, remaining deaf, acquired speech through the sense of sight, and has no opportunity of imitating by ear the pronunciation of others. It must also be remembered that this case is quoted from an old number of the *Phil. Trans.*, and cannot now be verified.

2. The circumstances quoted from the "Life and Journals of George Ticknor" (*NATURE*, vol. xxv. p. 101) are unreliable, because Ticknor *assumed* that all the pupils in the deaf and dumb schools he examined could never have heard a human sound,¹ whereas it is now known that a very large proportion of the deaf and dumb (probably more than 50 per cent.) could hear in infancy, and that of these a large proportion could also speak before becoming deaf.

3. In regard to the case of "E. R.," who had been taught articulation by Mr. Alley, of Manchester, Mr. Axon says, "that he became deaf and dumb at a very early age" (*NATURE*, vol. xxv. p. 191), but neglects to state at what age, which is very important—nor had Mr. Axon himself heard the articulation of this young man.

These are all the instances I know of, in which it is claimed that the pronunciation of any deaf person was due to inheritance, and I think I have shown that in all these cases the necessary data for such a conclusion have been wanting. I have already stated in a former communication (*NATURE*, vol. xxv. p. 124, *Comptes rendus*, xciii. p. 1036) that I have examined the pronunciation of at least 400 deaf children who have been taught to speak, without finding a single instance of peculiarity that could correctly be attributed to heredity. If any further argument is needed against inheritance of pronunciation, it is to be found in the universal fact that children who are born deaf are *always* also *dumb*.

That there is no incapacity of the vocal organs to account for this is evident, for these so-called "deaf-mutes" are now taught, through the medium of the sense of sight, to control the movements of their vocal organs so as to give utterance to intelligible words.

When we examine the languages and dialects of the world, I think we find that they have something in common, while each retain distinctive characteristics of its own. There seems to be a universal tendency to express the *emotions* in the same way. We speak, in fact, two languages at the same time:—One—the language of thought—arbitrary and conventional, acquired by imitation and not hereditary, consisting of articulations constituting words and sentences which can be recorded and preserved in written books; the other—the language of the emotions—natural and universal, consisting of looks and gestures, and of intonations of the voice. There seems good reason for the belief that this natural language of the emotions is instinctive, and therefore hereditary. From my own personal observations I feel sure that those who are interested in questions of heredity will find a rich field for inquiry in the study of the facial expressions and gestures of very young blind children; and in the natural sounds and the modulations of the voice of deaf infants.

Rome, March 6

ALEXANDER GRAHAM BELL

IN his letter on the above subject in *NATURE* (vol. xxv. p. 409) Mr. Axon appears not to appreciate the value of negative testimony in scientific investigation.

The citation of cases in support of M. Hément's statement that deaf mutes who have been taught to speak do so with the accent of their native districts, obviously implies the promulgation of a theory that dialectal accent is due to physiological peculiarities (? of the verbal organs), and that these are hereditary. This is shown by the objections raised to Prof. Graham Bell's statement that all such phenomena are due to "the unconscious recollection of former speech, and cannot be

¹ "Not one of the pupils of course can ever have heard a human sound," &c. "Life and Journals of George Ticknor." London, 1876. Vol. I. p. 196.